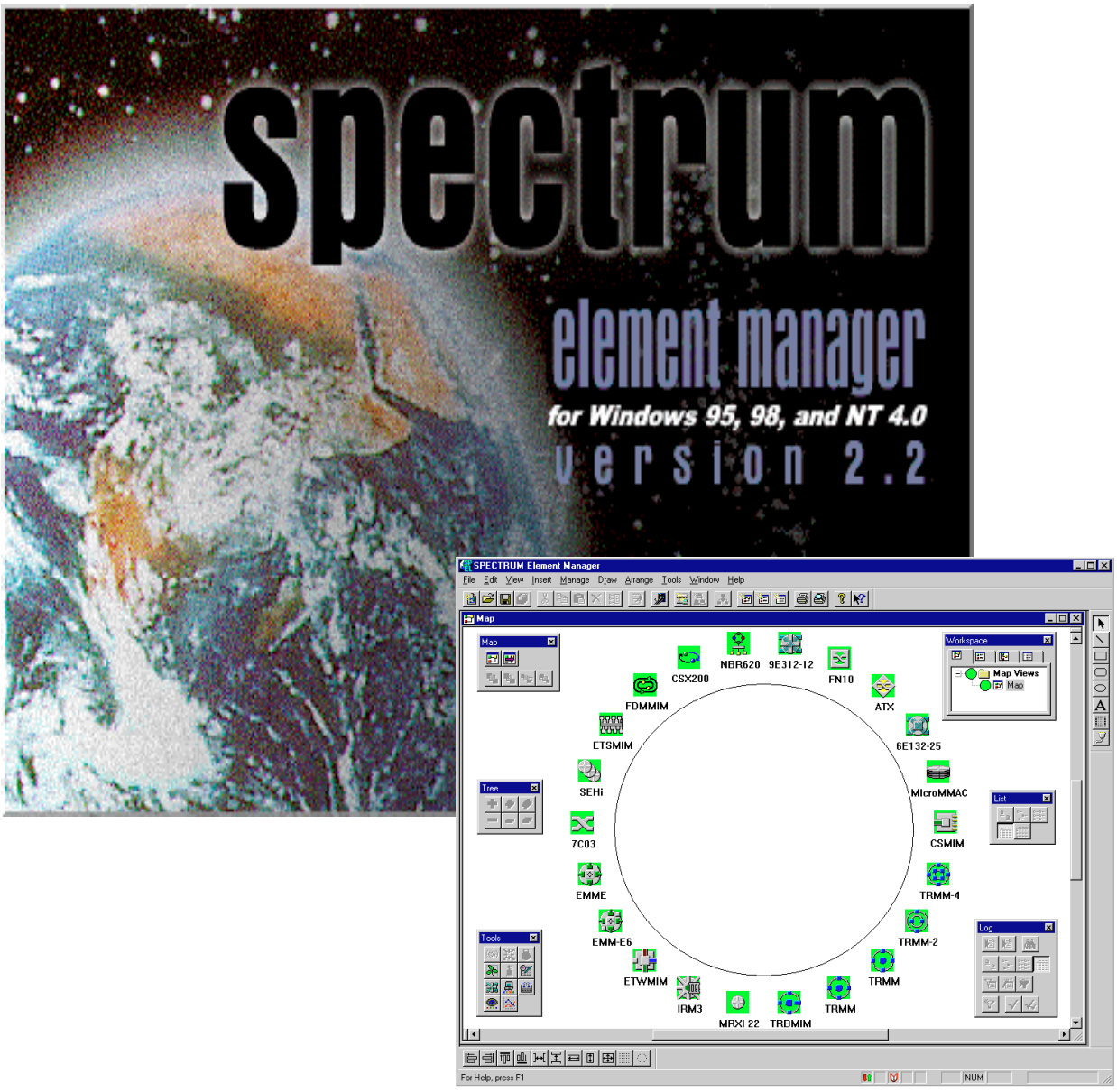

NB30
User's Guide

CABLETRON SYSTEMS

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Contents

Chapter 1 Introduction

Using the NB-30 Bridge User's Guide 1-1
Related Manuals 1-2
Software Conventions 1-3
    Using the Mouse 1-3
    Common NB-30 Bridge Window Fields 1-4
    Using Window Buttons 1-5
Getting Help 1-6
    Using On-line Help 1-6
    Accessing On-line Documentation 1-6
    Getting Help from the Cabletron Systems Global Call Center 1-7
NB-30 Bridge Firmware 1-7

Chapter 2 The NB-30 Bridge Chassis View

Viewing Chassis Information 2-2
    Front Panel Information 2-3
    Menu Structure 2-4
    The NB-30 Bridge Port Status Display 2-6
    Chassis Manager 2-6
    Viewing Hardware Types 2-7
Managing the Bridge 2-7
    Setting the Device Date and Time 2-8
    Enabling and Disabling Bridging 2-9

Chapter 3 NB-30 Bridging

Bridging Basics 3-1
    About Transparent Bridging 3-2
    Viewing and Managing Bridging Interfaces 3-2
Bridge Status 3-3
    Accessing Bridge Status Window Options 3-8
Enabling and Disabling Bridging 3-8
Bridge Statistics 3-9
    Performance Graphs 3-9
        Configuring Performance Graphs 3-12
    Bridge Summary Statistics 3-13
    Ethernet and Remote Port Statistics 3-14
        Port Packet Statistics 3-16
        Ethernet and Remote Port Problem Statistics 3-16

Ethernet and Remote Port Packet Discarded Statistics 3-17
Bridge Spanning Tree 3-17
Bridge Level Parameters 3-19
Bridge Port Level Parameters 3-21
Configuring Spanning Tree 3-22
Filtering Database 3-24
Configuring the Filtering Database 3-27
DSX-1 Summary 3-29
Configuring, Running, and Checking the Loopback Test 3-30
Viewing the T1 Link Channel Status 3-31
Restoring Bridge Defaults 3-31
Resetting Bridge Counters 3-32
Restarting the Bridge 3-32

Index

Chapter 1

Introduction

How to use this guide; related guides; software conventions; getting help; NB-30 Bridge firmware version

Welcome to the ***SPECTRUM Element Manager for the NB-30 User's Guide.*** We have designed this guide to serve as a simple reference for using SPECTRUM Element Manager for the NB-30 Bridge.

The NB-30 series bridge is a protocol-independent remote bridge that transparently connects two remote Ethernet LAN segments via a DDS, full T1/E1, or fractional T1 link. The bridge is fully compliant with the IEEE 802.1d Spanning Tree Algorithm specification used when bridges are placed in parallel, and it uses a source address table and filtering database to filter or forward network traffic.

It is also equipped with two media-configurable Single Port Interface Module (SPIM) slots. One SPIM is required to connect the bridge to the network; the other optional SPIM slot can be used to create a redundant link to a local network segment. Performance capabilities include a source address table capable of storing 8,191 addresses, a packet filtering rate of up to 10,000 frames per second, and a forwarding rate of up to 2,900 frames per second (or 3,800 frames if set up for full duplex operation).

Using the NB-30 Bridge User's Guide

Each chapter in this guide describes one major functionality or a collection of several smaller functionalities of the NB-30 Bridge. This guide contains information about software functions which are accessed directly from the device icon; for information about management functions which are accessed via the SPECTRUM Element Manager platform, consult the ***SPECTRUM Element Manager User's Guide*** or ***Tools Guide.***

Chapter 1, **Introduction**, provides a list of related documentation, describes certain software conventions, and shows you how to contact Cabletron Systems Technical Support.

Chapter 2, **The NB-30 Bridge Chassis View**, describes the visual display of the NB-30 Bridge and explains how to use the mouse within the Chassis View; the operation of several device-level management functions — such as changing the device display, enabling and disabling ports, and setting device date and time — is also described here.

Chapter 3, **NB-30 Bridging**, provides a comprehensive look at all management options associated with the bridge, including the Bridge Status window, the Bridge Performance Graphs, Bridge Port Statistics, DSX-1 Remote Port Setup, Bridge Summary Statistics, Spanning Tree, Filtering Database, restore defaults, reset counters, and restart bridge.

We assume that you have a general working knowledge of Ethernet IEEE 802.3 type data communications networks and their physical layer components, and that you are familiar with general bridging concepts.

Related Manuals

The NB-30 Bridge user's guide is only part of a complete document set designed to provide comprehensive information about the features available to you through SPECTRUM Element Manager. Other guides which include important information related to managing the NB-30 include:

Cabletron Systems' ***SPECTRUM Element Manager User's Guide***

Cabletron Systems' ***SPECTRUM Element Manager Tools Guide***

Cabletron Systems' ***SPECTRUM Element Manager Remote Administration Tools User's Guide***

Cabletron Systems' ***SPECTRUM Element Manager Alarm and Event Handling User's Guide***

Cabletron Systems' ***Network Troubleshooting Guide***

Microsoft Corporation's ***Microsoft Windows User's Guide***

For more information about the capabilities of the NB-30 Bridge, consult the appropriate hardware and local management documentation.

Software Conventions

SPECTRUM Element Manager's device user interface contains a number of elements which are common to most windows and which operate the same regardless of which window they appear in. A brief description of some of the most common elements appears below; note that the information provided here is not repeated in the descriptions of specific windows and/or functions.

Using the Mouse

This document assumes you are using a Windows-compatible mouse with two buttons; if you are using a three button mouse, you should ignore the operation of the middle button when following procedures in this document. Procedures within the SPECTRUM Element Manager document set refer to these buttons as follows:

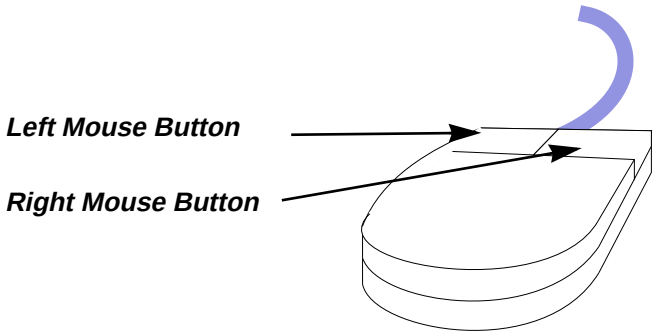


Figure 1-1. Mouse Buttons

For many mouse operations, this document assumes that the left (primary) mouse button is to be used, and references to activating a menu or button will not include instructions about which mouse button to use.

However, in instances in which right (secondary) mouse button functionality is available, instructions will explicitly refer to **right** mouse button usage. Also, in situations where you may be switching between mouse buttons in the same area or window, instructions may also explicitly refer to both **left** and **right** mouse buttons.

Instructions to perform a mouse operation include the following terms:

- **Pointing** means to position the mouse cursor over an area without pressing either mouse button.
- **Clicking** means to position the mouse pointer over the indicated target, then press and release the appropriate mouse button. This is most commonly used to select or activate objects, such as menus or buttons.

- **Double-clicking** means to position the mouse pointer over the indicated target, then press and release the mouse button two times in rapid succession. This is commonly used to activate an object's default operation, such as opening a window from an icon. Note that there is a distinction made between "click twice" and "double-click," since "click twice" implies a slower motion.
- **Pressing** means to position the mouse pointer over the indicated target, then press and hold the mouse button until the described action is completed. It is often a pre-cursor to Drag operations.
- **Dragging** means to move the mouse pointer across the screen while holding the mouse button down. It is often used for drag-and-drop operations to copy information from one window of the screen into another, and to highlight editable text.

Common NB-30 Bridge Window Fields

Similar descriptive information is displayed in boxes at the top of most device-specific windows in SPECTRUM Element Manager, as illustrated in Figure 1-2, below.

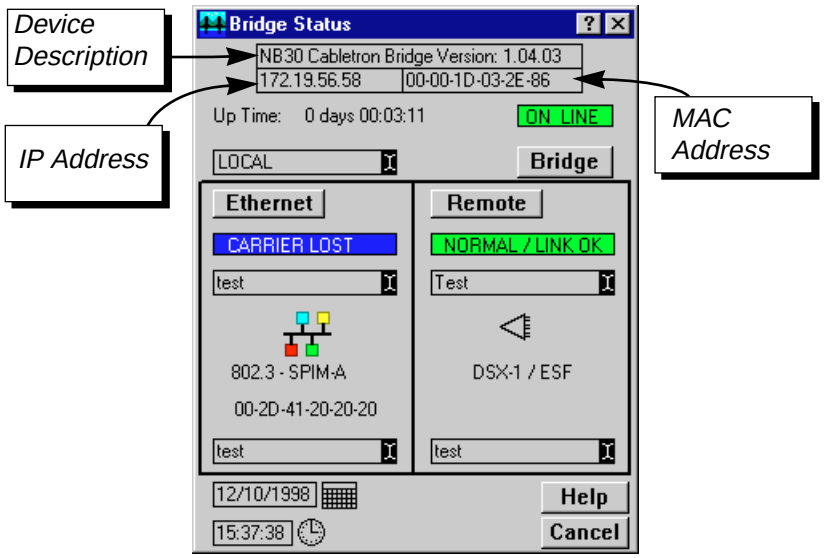


Figure 1-2. Sample Window Showing Informational Text Boxes

Device Description

Displays the SNMP MIB-II System Description for the bridge. This is a read-only description used to identify the hardware type and firmware/software operating system of the managed device.

IP Address
Displays the device's IP (Internet Protocol) Address; this will be the IP address used to define the device icon. IP addresses are assigned via Local Management for the NB-30; they cannot be changed via SPECTRUM Element Manager.

MAC Address
Displays the manufacturer-set MAC address of the port through which SPECTRUM Element Manager is communicating with the NB-30 Bridge. This address is factory-set and cannot be altered.

Up Time
Displays the amount of time, in a day(s) hh:mm:ss format, that the NB-30 Bridge has been running since the last start-up.

Informational fields describing the ports being modeled are also displayed in most windows:

Port Number
Displays the number of the monitored port.

Port Name
Displays the user-defined name of the port. You can change the port name via the **Port Name** text box available from the Bridge Status window.

Using Window Buttons

The **Cancel** button that appears at the bottom of most windows allows you to exit a window and terminate any unsaved changes you have made. You may also have to use this button to close a window after you have made any necessary changes and set them by clicking on an **OK**, **Set**, or **Apply** button.

An **OK**, **Set**, or **Apply** button appears in windows that have configurable values; it allows you to confirm and SET changes you have made to those values. In some windows, you may have to use this button to confirm each individual set; in other windows, you can set several values at once and confirm the sets with one click on the button.

The **Help** button brings up a Help text box with information specific to the current window. For more information concerning Help buttons, see **Getting Help**, below.

The command buttons, for example **Bridge**, call up a menu listing the windows, screens, or commands available for that topic.

Any menu topic followed by ... (three dots) — for example **Statistics...** — calls up a window or screen associated with that topic.

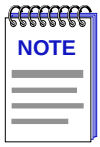
Getting Help

This section describes different methods of getting help for questions or concerns you may have while using SPECTRUM Element Manager.

Using On-line Help

You can use the NB-30 Bridge window **Help** buttons to obtain information specific to the device. When you click on a Help button, a window will appear which contains context-sensitive on-screen documentation that will assist you in the use of the windows and their associated command and menu options. Note that if a **Help** button is grayed out, on-line help has not yet been implemented for the associated window.

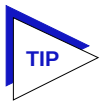
From the **Help** menu accessed from the Chassis View window menu bar, you can access on-line Help specific to the Chassis View window, as well as bring up the Chassis Manager window for reference. Refer to **Chapter 2** for information on the Chassis View and Chassis Manager windows.



All of the online help windows use the standard Microsoft Windows help facility. If you are unfamiliar with this feature of Windows, you can select ***Help*** *from the* ***Start*** *menu,* ***Help —>How to Use Help*** *from the primary SPECTRUM Element Manager window, or consult your Microsoft Windows product* **User's Guide**.

Accessing On-line Documentation

The complete suite of documents available for SPECTRUM Element Manager can be accessed via a menu option available from the primary window menu bar: **Help—>Online Documents**. If you chose to install the documentation when you installed SPECTRUM Element Manager, selecting this option will launch Adobe's Acrobat Reader and a menu file which provides links to all other available documents.



If you have not yet installed the documentation, the ***Online Documents*** *option will not be able to access the menu file; in order to activate this option, you must run the setup.exe again to install the documentation component. See your* **User's Guide** *for details.*

Getting Help from the Cabletron Systems Global Call Center

If you need technical support related to SPECTRUM Element Manager, or if you have any questions, comments, or suggestions related to this manual or any of our products, please feel free to contact the Cabletron Systems Global Call Center via one of the following methods:

By phone:	(603) 332-9400 *24 hours a day, 365 days a year*
By mail:	Cabletron Systems, Inc. PO Box 5005 Rochester, NH 03866-5005
By Internet mail:	support@ctron.com
FTP:	ftp.ctron.com (134.141.197.25)
Login *Password*	`anonymous` `your email address`
By BBS:	(603) 335-3358
Modem Setting	8N1: 8 data bits, 1 stop bit, No parity

For additional information about Cabletron Systems products, visit our World Wide Web site: **http://www.cabletron.com/**. For technical support, select **Service and Support**.

NB-30 Bridge Firmware

SPECTRUM Element Manager support for the NB-30 Bridge has been tested against firmware versions up to 1.04.03 and later; if you have an earlier version of firmware and experience problems, contact the Cabletron Systems Global Call Center for upgrade information.

Chapter 2

The NB-30 Bridge Chassis View

Information displayed in the Chassis View window; the logical chassis view; the Chassis Manager window; bridge management functions

---

The NB-30 Bridge Chassis View window is the main screen that immediately informs you of the current condition of individual ports on your bridge via a graphical display. The Chassis View window also serves as a single point of access to all other NB-30 Bridge windows and screens, which are discussed at length in the following chapters.

To access the NB-30 Bridge Chassis View window, use one of the following options;

Figure 2-1. NB-30 Bridge Icon

1. In any map, list, or tree view, double click on the **NB-30** you wish to manage;

   or

1. In any map, list, or tree view, double click the **left** mouse button once to select the **NB-30** you wish to manage.
2. Select **Manage —> Node** from the primary window menu bar, or select the manage node toolbar button.

   or

1. In any map, list, or tree view, double click the **right** mouse button once to select the **NB-30** you wish to manage.
2. On the resulting menu, click to select **Manage**.

Viewing Chassis Information

The NB-30 Bridge Chassis View window (Figure 2-2) provides a graphic representation of the NB-30 Bridge, including a color-coded port display which immediately informs you of the current status of bridging at each port.

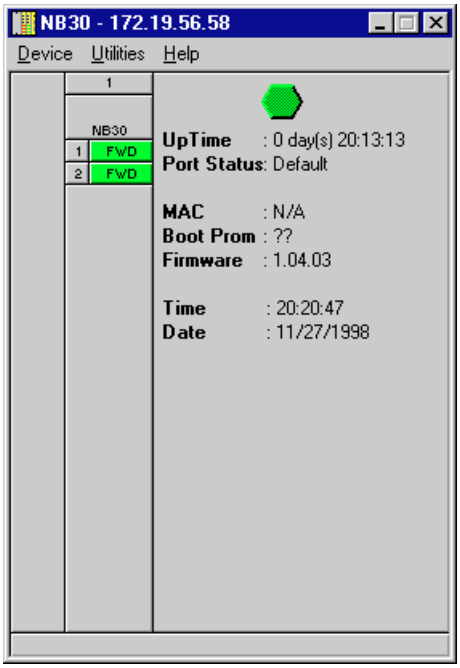


Figure 2-2. NB-30 Bridge Chassis View Window

By clicking in designated areas of the chassis graphical display (as detailed later in this chapter), or by using the menu bar at the top of the Chassis View window, you can access all of the menus that lead to more detailed device and port-level windows.

TIP

When you move the mouse cursor over a management "hot spot" the cursor icon will change into a "hand" (☞) to indicate that clicking in the current location will bring up a management option.

Front Panel Information

The areas surrounding the main port display area provide the following device information:

IP

The Internet Protocol address assigned to the NB-30 appears in the title bar of the Chassis View window; this will display the IP address you have used to create the NB-30 icon. IP addresses are assigned via Local Management.

Connection Status

This color-coded area indicates the current state of communication between SPECTRUM Element Manager and the NB-30 bridge.

- **Green** indicates the NB-30 bridge is responding to device polls (valid connection).
- **Magenta** indicates that the NB-30 bridge is reconfiguring because of a change in the Spanning Tree; note that board and port menus are inactive during this stand-by state.
- **Blue** indicates an unknown contact status — polling has not yet been established with the NB-30 bridge.
- **Red** indicates the NB-30 bridge is not responding to device polls (device is off line, or device polling has failed across the network for some other reason).

Up Time

The amount of time, in a day(s) hh:mm:ss format, that the NB-30 bridge has been running since the last start-up.

Port Status

Displays the port status currently in effect. Management for the NB-30 supports one port display, therefore this field will state **Default**.

MAC

The physical layer address assigned to the port through which SPECTRUM Element Manager is communicating with the NB-30 bridge. MAC addresses are hard-coded in the device, and are not configurable.

Boot Prom

The revision of BOOT PROM installed in the device. This field will not be available for the NB-30 bridge.

Firmware

The revision of device firmware stored in the NB-30 bridge's FLASH PROMs.

Time

The current time, in a 24-hour hh:mm:ss format, set in the NB-30 bridge's internal clock.

Date
The current date, in an mm/dd/yyyy format, set in the NB-30 Bridge's internal clock.

NOTES

You can set the date and time by using the ***Edit Device Date*** *and* ***Edit Device Time*** *options on the Device menu; see* ***Setting the Device Date and Time****, page 2-8, for details.*

In accordance with Year 2000 compliance requirements, SPECTRUM Element Manager now displays and allows you to set all dates with four-digit year values.

Menu Structure

By clicking on various areas of the NB-30 Bridge Chassis View display, you can access menus with device- and port-level options, as well as utility applications which apply to the device. The following illustration displays the menu structure and indicates how to use the mouse to access the various menus:

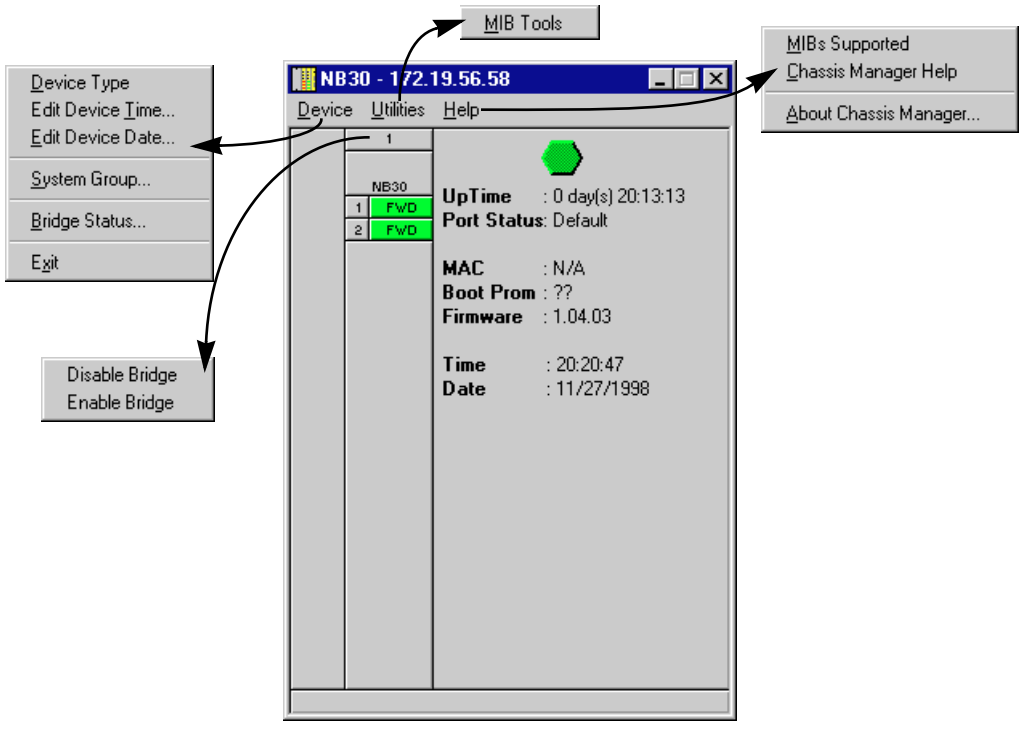


Figure 2-3. NB-30 Bridge Chassis View Menu Structure

The Device Menu

From the Device Menu at the Chassis View window menu bar, you can access the following selections:

- **Device Type...**, which displays a window containing a description of the device being modeled: NB-30 - Remote Bridge.
- **System Group...**, which allows you to manage the NB-30 Bridge via SNMP MIB II. Refer to the ***Generic SNMP User's Guide*** for further information.
- **Bridge Status...**, which opens a window that provides an overview of bridging information for each port, and allows you to access all other bridge-related options. Refer to Chapter 3, **NB-30 Bridging**, for more information.
- **Exit**, which closes the NB-30 Bridge Chassis View window.

The Utilities Menu

The Utilities menu provides access to the MIB Tools utility provided by SPECTRUM Element Manager for use with the NB-30. The MIB Tools utility provides direct access to the NB-30's MIB information. This selection is also available from the **Tools** menu at the top of SPECTRUM Element Manager's main window.

Refer to your ***Tools Guide*** for information on the MIB Tools utility.

The Help Menu

The Help Menu has three selections:

- **MIBs Supported**, which brings up the Chassis Manager window; see **Chassis Manager**, page 2-6, for more information.
- **Chassis Manager Help**, which brings up a help window with information specifically related to using the Chassis Manager and Chassis View windows.
- **About Chassis Manager...** which brings up a version window for the Chassis Manager application in use.

The Board Menu

The Board menu for the NB-30 Bridge provides a single selection (which is also available from the Bridge Status window):

- **Disable/Enable Bridge**, which enables or disables bridging across the NB-30.

The NB-30 Bridge Port Status Display

Each port display on the NB-30 will indicate that port's current bridging state:

FWD (Forwarding)	(Green) The port is on line and forwarding packets across the NB-30 from one network segment to another.
DIS (Disabled)	(Blue) Bridging at the port has been disabled by management; no traffic can be received or forwarded on this port, including configuration information for the bridged topology.
LRN (Learning)	(Magenta) The Forwarding database is being created, or the Spanning Tree Algorithm is being executed because of a network topology change. The port is monitoring network traffic, and learning network addresses.
LIS (Listening)	(Magenta) The port is not adding information to the filtering database. It is monitoring Bridge Protocol Data Unit (BPDU) traffic while preparing to move to the forwarding state.
BLK (Blocking)	(Orange) The port is on line, but filtering traffic from going across the NB-30 from one network segment to another. Bridge topology information will be forwarded by the port.
BRK (Broken)	(Red) The physical interface has malfunctioned.

Chassis Manager

Like most networking devices, Cabletron's devices draw their functionality from a collection of proprietary MIBs and IETF RFCs. In addition, Cabletron's newer intelligent devices organize their MIB data into a series of "components." A MIB component is a logical grouping of MIB data, and each group controls a defined set of objects. Note that there is no one-to-one correspondence between MIBs and MIB components; a single MIB component might contain objects from several different proprietary MIBs and RFCs.

The Chassis Manager window, Figure 2-4, is a read-only window that displays the MIBs and the MIB components — and, therefore, the functionality — supported by the currently monitored device.

To view the Chassis Manager window:

1. Click on **Help** on the far right of the menu bar at the top of the Chassis View window.
2. Drag down to **MIBs Supported**, and release.

The NB-30 does not support MIB Components.

The MIBs which provide the NB-30 Bridge's functionality — both proprietary MIBs and IETF RFCs — are listed here

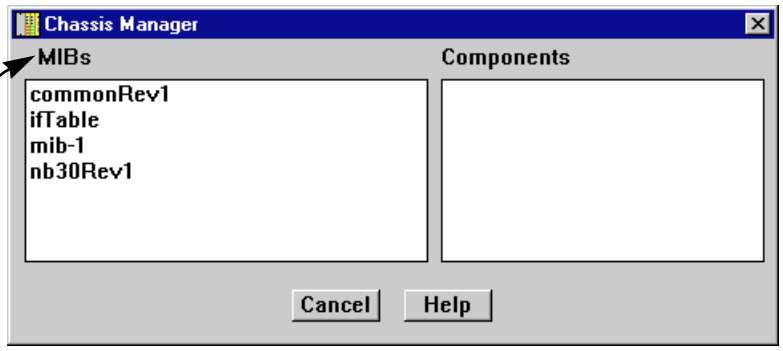


Figure 2-4. Chassis Manager Window

Viewing Hardware Types

In addition to the graphical displays described above, choosing the **Device Type** option on the Device menu brings up a window that describes the management device being modeled:

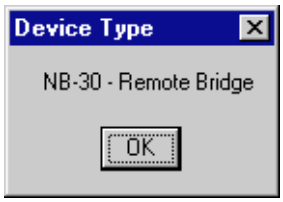


Figure 2-5. Device Type Window

Managing the Bridge

In addition to the configuration information described in the preceding sections, the Chassis View also lets you manage your bridge. Bridge management functions include setting device date and time, and enabling and disabling bridging.

Setting the Device Date and Time

The **Device** menu provides access to two methods for changing the date and time stored in the device's internal clock: you can select the **Edit Device Time** and **Edit Device Date** options from the menu itself, or you can use the I-bar cursor at the appropriate field in the Bridge Status window; see Chapter 3, **NB-30 Bridging**, for more information.

To edit the device time:

1. Click on **Device** on the Chassis View window menu bar to access the Device menu; drag down to **Edit Device Time**, and release. The following change window, Figure 2-6, will appear.

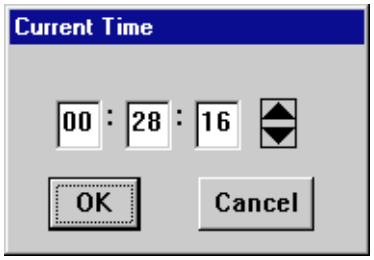


Figure 2-6. Edit Time Window

2. Enter the new time in a 24-hour hh:mm:ss format, either by highlighting the field you wish to change and using the up and down arrow buttons, or by simply entering the new value in the appropriate field.
3. Click on **OK** to save the changes, or on **Cancel** to exit without changes.

To edit the device date:

1. Click on **Device** on the Chassis View window menu bar to access the Device menu; drag down to **Edit Device Date**, and release. The following change window, Figure 2-7, will appear.

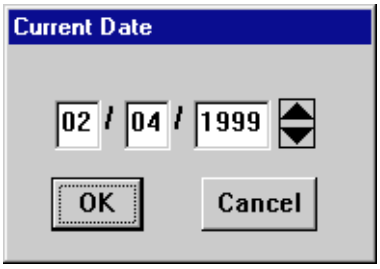
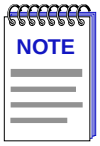


Figure 2-7. Edit Date Window

2. Enter the new date in an mm/dd/yyyy format, either by highlighting the field you wish to change and using the up and down arrow buttons, or by simply entering the new value in the appropriate field.
3. Click on **OK** to save the changes, or on **Cancel** to exit without changes.



In accordance with Year 2000 compliance requirements, SPECTRUM Element Manager now displays and allows you to set all dates with four-digit year values.

Enabling and Disabling Bridging

When you disable a bridge, you disconnect all its port networks from the bridge entirely. Its bridge ports do not forward any packets, nor do they participate in Spanning Tree operations. Nodes connected to the networks can still communicate with each other, but they can't communicate with the bridge and other networks connected to the bridge. When you enable bridge ports, they move from the Disabled state through the Learning and Listening states to the Forwarding or Blocking state (as determined by Spanning Tree).

When you disable bridging across the device, you simultaneously disable bridging at all ports supported by the device.

To enable or disable bridging at the NB-30:

1. Click on the **Board Index (1)** on the logical device display. A menu will appear.
2. Click on **Enable Bridge** to restart bridging at the device level, or **Disable Bridge** to halt bridging across the entire device.

Chapter 3

NB-30 Bridging

Bridge management overview; viewing and managing bridging interfaces; using the Bridge Status window; viewing bridge statistics; using Spanning Tree; using the Filtering Database; Restoring bridge defaults; Resetting bridge defaults; Restarting the bridge.

Bridging Basics

Bridges are used in local area networks to connect two or more network segments and to control the flow of packets between the segments. Ideally, bridges forward packets to another network segment only when necessary.

Bridges are also used to increase the fault tolerance in a local area network by creating redundant bridge paths between network segments. In the event of a bridge or bridge segment failure, an alternate bridge path will be available to network traffic, without significant interruption to its flow.

The method a bridge uses to forward packets, choose a bridge path, and ensure that a sending station's messages take only one bridge path depends on the bridge's type: Transparent (generally used in Ethernet or FDDI environments) or Source Routing (generally used in Token Ring environments), Source Route-Transparent, or Source Route-Translational—the two latter being combinations that are found in a mixed network environment. Because the NB-30 is a transparent bridge, this chapter describes viewing and configuration options related to Transparent bridging.

About Transparent Bridging

Transparent bridges are most common in Ethernet networks. Individual Transparent bridges monitor packet traffic on attached network segments to learn where end stations reside in relation to each segment by mapping the Source Address of each received frame to the port (and segment) it was detected on. This information gets stored in the bridge's Filtering Database.

When in the Forwarding state, the bridge compares a packet's destination address to the information in the Filtering Database to determine if the packet should be forwarded to another network segment or filtered (i.e., not forwarded). A bridge filters a packet if it determines that the packet's destination address exists on the same side of the bridge as the source address.

If two or more bridges are connected to the same Ethernet LAN segment—placed in parallel—only a single bridge must be allowed to forward data frames onto that segment. If two or more bridges were forwarding data frames onto the same Ethernet segment, the network would soon be flooded.

With a data loop in the topology, bridges would erroneously associate a single source address with multiple bridge ports, and keep proliferating data by forwarding packets in response to the ever-changing (but incorrect) information stored in their Filtering Database.

To avoid such data storms, Transparent bridges communicate with one another on the network by exchanging Bridge Protocol Data Units (BPDUs) to determine the network topology and collectively implement a Spanning Tree Algorithm (STA) that selects a controlling bridge for each LAN segment; this ensures that only a single data route exists between any two end stations and that topology information remains current.

Viewing and Managing Bridging Interfaces

With SPECTRUM Element Manager, you can view and manage each bridging interface supported by your NB-30. You manage your bridge by using the following windows:

- The **Bridge Status** window provides you with basic information about the current status of the NB-30's bridging interfaces, allows you to configure each interface, and lets you enable or disable bridging across the bridge. The Bridge Status window also lets you access further windows to configure bridging at the NB-30 (see **Bridge Status**, page 3-3).
- Bridge Statistics—including the **Performance Graph, Bridge Summary Statistics** and the **Ethernet** and **Remote Port Statustics** windows—graphically display the traffic passing between your bridged networks, and let you compare and contrast traffic processed by each interface (see **Bridge Statistics**, page 3-9).

- The **Spanning Tree** window shows bridge port information and protocol parameters relating to the Spanning Tree Algorithm—the method of determining the controlling bridge when a series of bridges are placed in parallel (see **Bridge Spanning Tree**, page 3-17).
- With the **Filtering Database** window, you can see the contents of the Permanent and Acquired databases — the two address databases which construct the bridge's Source Address Table. The bridge uses the contents of these databases to make its packet filtering and forwarding decisions. You can configure entries in these databases to increase bridging efficiency across your network (see **Filtering Database**, page 3-24).
- The **Restore Bridge Defaults**, **Reset Counters**, and **Restart Bridge** options allow you to reset default values for various bridge parameters, refresh bridge statistics to zero, or perform a software reset of the bridge (see **Restoring Bridge Defaults**, page 3-31; **Resetting Bridge Counters**, page 3-32; or **Restarting the Bridge**, page 3-32).
- If you have a DSX-1 module installed in your NB-30, the Bridge **DSX-1 Summary** window lets you test the status of the remote port's link to the bridge at the other end of the T1 link, and to see the status of each of the DSX-1 channels (see **DSX-1 Summary**, page 3-29) .

The following sections detail how to use each of the bridge management windows.

Bridge Status

The Bridge Status window provides you with basic information about the current status of bridging across your device. Color-coding of each port display allows you to quickly ascertain the status of each interface. The Bridge Status window also lets you access further windows to control bridging at your NB-30.

To access the Bridge Status window from the Chassis View window:

1. Click on the **Device** selection in the menu bar. A menu will appear.
2. Click on **Bridge Status...**. The Bridge Status window, Figure 3-1, will appear.

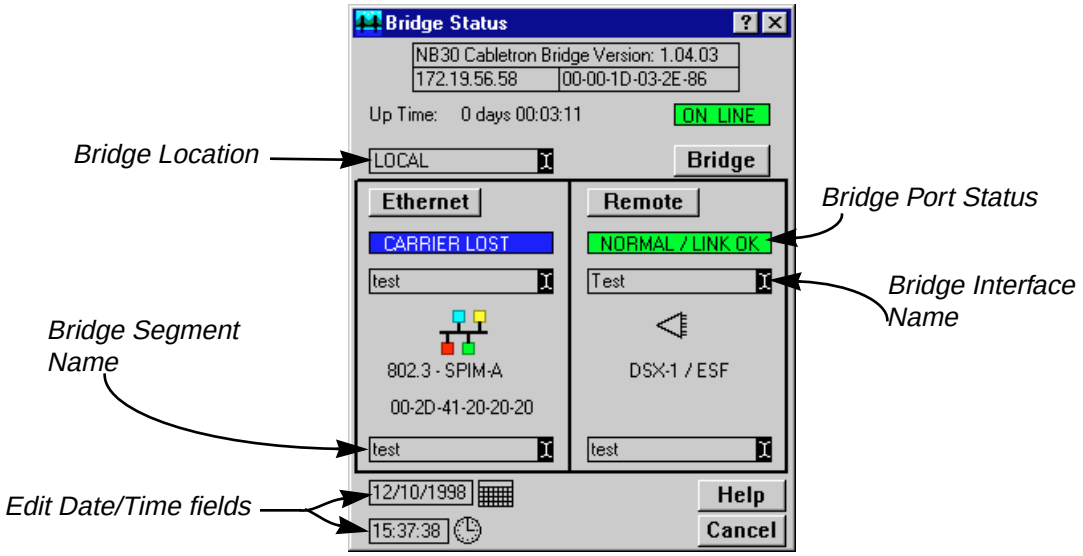


Figure 3-1. The NB-30 Bridge Status Window

The following information is provided by the Bridge Status window for the NB-30 and for each individual bridging interface.

Up Time

At the top of the Bridge Status window, you can see the time period (in a days, hh:mm:ss format) that has elapsed since the NB-30 was last reset or initialized.

Bridge Status Condition

This color-coded text box indicates the current operating status of the bridge; i.e., ON LINE (green), STANDBY (magenta), or DISABLED (red).

Bridge Location

This settable information field allows you to enter a description of the bridge's physical location (up to 14 characters). To do so:

1. Click on the I-bar cursor (I) to the right of the **Bridge Location** field. The Bridge Location text box will appear.
2. Type in the new bridge location in the text box, then click on **OK**.

The newly assigned location name will appear in the Bridge Location information field. The default bridge name for the NB-30 is "LOCAL."

Bridge State on Interface

This color-coded text box indicates the state of bridging over the port interface. Note that this state (and its corresponding color code) will also be reflected on the NB-20E/25E Port display in the Chassis View window. Possible bridge states and their corresponding colors are:

FWD (Forwarding)	(Green) The port is on-line and forwarding packets across the NB-20E/25E from one network segment to another.
DIS (Disabled)	(Blue) Bridging at the port has been disabled by management; no traffic can be received or forwarded on this port, including configuration information for the bridged topology.
LRN (Learning)	(Magenta) The Forwarding database is being created, or the Spanning Tree Algorithm is being executed because of a network topology change. The port is monitoring network traffic, and learning network addresses.
LIS (Listening)	(Magenta) The port is not adding information to the filtering database. It is monitoring Bridge Protocol Data Unit (BPDU) traffic while preparing to move to the forwarding state.
BLK (Blocking)	(Orange) The port is on-line, but filtering traffic from going across the NB-20E/25E from one network segment to another. Bridge topology information will be forwarded by the port.
BRK (Broken)	(Red) The physical interface has malfunctioned.

The port **Status** is taken from Cabletron's proprietary Bridge MIB, as the NB-30 is an older bridge. Potential status conditions are:

OFF	The port is off, due to a failed network interface chip associated with that port.
OK/SQE ON	The port is communicating with the network and the transceiver making the connection to the network has SQE enabled.
OK/SQE OFF	The port is communicating with the network and the transceiver making the connection to the network has SQE disabled.
CARRIER LOST	Communication with the network has not been established or has been lost

Bridge Status on Remote Port Interface

This color-coded text box indicates the operating status of the remote port. Possible status conditions are:

- LINK OK/DCE READY (green) — Indicates that communication between the remote port and the data circuit-terminating equipment (DCE) is established and ready to transfer data.
- NET LOOP/LINK OK (green) — Indicates that the port is looped towards the network and that the port is ready for transmission.
- NET LOOP/LINK LOST (blue) — Indicates that the remote port, looped towards the network, is not receiving any signal.
- NET LOOP/RED ALARM (red) — Indicates that the remote port, looped towards the network, has lost synchronization on the bridge's receive link.
- NET LOOP/YELLOW ALARM (yellow) — Indicates that the remote port's loop towards the network has lost synchronization on the remote bridge's receive link (i.e., the remote bridge on the other side of the link is in Red Alarm condition).
- REM LOOP/LINK OK (green) — Indicates that the port is performing a remote loopback test and that the port is ready for transmission.
- REM LOOP/LINK LOST (blue) — Indicates that the port performing a remote loopback test is not receiving any signal.
- REM LOOP/RED ALARM (red) — Indicates that the port performing a remote loopback test has lost synchronization on the bridge's receive link.
- REM LOOP/YELLOW ALARM (yellow) — Indicates that the port performing a remote loopback test has lost synchronization on the remote bridge's receive link (i.e., the remote bridge on the other side of the link is in Red Alarm condition).
- NORMAL /LINK OK (green) — Indicates that the port is in normal T1 Link operation and is ready for transmission.
- NORMAL /LINK LOST (blue) — Indicates that the port, in normal T1 Link operation, is not receiving any signal.
- NORMAL /RED ALARM (red) — Indicates that the port, in normal T1 Link operation, has lost synchronization on the bridge's receive link.
- NORMAL /YELLOW ALARM (yellow) — Indicates that the port, in normal T1 Link operation, has lost synchronization on the remote bridge's receive link (i.e., the remote bridge on the other side of the link is in Red Alarm condition).
- DCE NOT READY/NO DM (blue) — Indicates that the DCE is not in the data transfer mode.
- DCE NOT READY/NO CTS (blue) — Indicates that the DCE is not ready to transmit data.

- NO EXT CLOCK (blue) — Indicates that the remote port is not receiving a clock signal from the DCE.

Interface Name

This settable information field allows you to enter a name for the bridge's active local port and its remote port. The default name for the bridge's two network interfaces are ETHERNET PORT and REMOTE PORT, respectively. To assign a new name to an interface:

1. Click on the I-bar cursor ( ) to the right of the **Interface Name** field. The Bridge Port Name text box will appear.
2. Type in the new interface name in the text box (up to 14 characters), then click on **OK**.

The assigned name will appear in the Bridge Interface Name information field.

Interface Type

Indicates the interface type which applies to each NB-30 bridging port interface. Possible types are 802.3 SPI (SPIM) for the local Ethernet port and RS449 (Remote Interface Card supporting RS449/422 communications),V.35 (Remote Interface Card supporting V.35 communications), DSX1/D4 (superframe format for T1 link), DSX1/ESF (extended superframe format for T1 link).

Bridge Port Address — Local Ethernet Port

Indicates the physical address of the local Ethernet port on the NB-30. No physical address is available for the remote port.

Segment Name

This settable information field allows you to enter a name for each segment attached to the bridge's ports. The default name for the bridge's two network segments are LAN_1 and REMOTE LINK, respectively. To assign a new name to the network segment connected to a port:

1. Click on the I-bar cursor ( ) to the right of the **Segment Name** field. The Bridge Network Name text box will appear.
2. Type in the new segment name in the text box, then click on **OK**.

The newly assigned name will appear in the Bridge Segment Name information field.

Date and Time

At the bottom of the Bridge Status window, fields display the current date and time set at the NB-30's internal clock. You can change the date and time by using the and symbols respectively. Clicking on these symbols will invoke Date and Time pop-up windows which you can use to set the internal clock (as described in the previous chapter).

Accessing Bridge Status Window Options

At the top of the Bridge Status window, you can click on **Bridge** to access a menu that provides other bridge management options:

- The **Spanning Tree** window, which allows you to set the Spanning Tree Algorithm parameters for bridging on your NB-30 (see **Bridge Spanning Tree**, page 3-17).
- The **Disable/Enable Bridge** options, which allow you to suspend or resume bridge operations (see **Enabling and Disabling Bridging**, page 3-8).
- A Bridge **Performance Graph** window and **Bridge Summary Statistics** window, which display network statistics — both numerically and graphically — for traffic across the entire bridge (see **Bridge Statistics**, page 3-9).

  You can also access a Performance Graph and Statistics window for each individual interface by clicking on a port index button to display the port level management options (see **Bridge Statistics**, page 3-9).
- The **Filtering Database** window, which lets you configure the NB-30 bridge's Acquired and Permanent filtering databases to filter or forward traffic across the NB-30 (see **Filtering Database**, page 3-24).
- The **Reset Counters**, **Restore Defaults**, and **Restart Bridge** options, which allow you to refresh operating parameters at the bridge (see **Restoring Bridge Defaults**, page 3-31; **Resetting Bridge Counters**, page 3-32; or **Restarting the Bridge**, page 3-32).

Enabling and Disabling Bridging

When you disable a bridge, you disconnect all its port networks from the bridge entirely. Its bridge ports do not forward any packets, nor do they participate in Spanning Tree operations. Nodes connected to the networks can still communicate with each other, but they can't communicate with the bridge and other networks connected to the bridge. When you enable bridge ports, they move from the Disabled state through the Learning and Listening states to the Forwarding or Blocking state (as determined by Spanning Tree).

When you disable bridging across the device, you simultaneously disable bridging at all ports supported by the device.

To disable bridging across both ports on your NB-30 from the Bridge Status window:

1. From the Bridge Status window, click on **Bridge**. A menu will appear.
2. Click on **Enable Bridge** to restart bridging at the device level, or **Disable Bridge** to halt bridging across the entire device.

You can also disable bridging across all ports or on your NB-30 from the Chassis View window. To disable bridging at the device level from the Chassis View window:

1. Click on the **Board Index (1)** in the front panel display. A menu will appear.
2. Click on **Enable Bridge** to restart bridging at the device level, or **Disable Bridge** to halt bridging across the entire device.

Bridge Statistics

The following sections describe the Statistics windows that are available for the NB-30 bridge that is being monitored via SPECTRUM Element Manager, both at the device and port levels.

Performance Graphs

You use Bridge Performance Graphs to view a color-coded strip chart that shows you the traffic being bridged through all networks or an individual network supported by your device. You can configure the display to show frames filtered, forwarded, or transmitted across the device or its individual bridging interfaces, as well as the number of errors experienced at both levels. The graph has an X axis that indicates the 60-second interval over which charting occurs continuously, while its Y axis measures the number of packets or errors that are processed by the device or its bridging interfaces.

You can select the type of errors you wish to monitor by using the available menu buttons. When you click on the error type you wish to view, the name of that error will appear in the button, and the Performance Graph will refresh. The graph will now generate a strip chart based on the newly defined parameters.

At the device level, a **Detail** button on the window allows you to compare the packets forwarded, filtered, or transmitted on all networks supported by the device, as well as errors on all networks.

For a selected bridged network, the **Detail** button allows you to view the number of packets forwarded to, or received from, each other network supported by the device.

To access the device-level Bridge Performance Graph window:

1. From the Bridge Status window, click on **Bridge**. A menu will appear.
2. Click on **Performance Graph...**. The NB-30 Bridge Performance Graph window, Figure 3-2, will appear.

To access the NB-30 port Bridge Performance Graph window:

1. From the Bridge Status window, click on the appropriate **port** button (**Ethernet** or **Remote**). The Port menu will appear.
2. Click on **Performance Graph...**. The NB-30 port Bridge Performance Graph window will appear.

NOTE

The graphic displayed in Figure 3-2 is a device-level window; the window that is displayed at the port level is virtually identical.

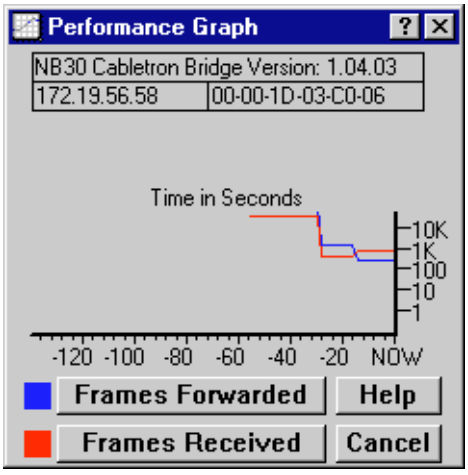


Figure 3-2. Bridge Performance Graph

For the Bridge level window, you can select two of the following statistics to display. The graphical display will update at 2 second intervals. For the first 120 seconds of graphing, you will note the graph lines extending as each interval's data is added to the graph. After the first 120 seconds expires, the newest data is added at the right edge of the graph, and the oldest data is scrolled off to the left.

Frames Forwarded
The number of frames forwarded by both ports on the NB-30's bridge.

Frames Received
The total number of frames received by both ports on the NB-30's bridge.

Frames Filtered
The total number of frames filtered by both ports on the NB-30's bridge.

Device Errors
The total number of frames (either inbound or outbound) containing errors which prevented them from being processed by the bridge's interfaces.

Nothing
The selected scale is not currently in use.

For the port level window, you can choose from among the following display options. Note that some of these options are available only for the local Ethernet port or only for the remote port, as indicated in the field definitions below.

Frames Received
The total number of frames received by the selected bridge interface from the other bridge interface, as read from the device after each poll interval.

Discarded Inbound (Ethernet Port Only)
Displays the number of packets which were discarded at the port on reception. One possible reason would be to free up buffer space — even though no errors were detected in the packet on reception. Discarding good packets often indicates a very busy network. If a device routinely discards packets, it usually means that network traffic is overwhelming the device — perhaps because the device's performance is inadequate for the rate of traffic on the network.

Another reason might be that the incoming packet was not formed correctly for use on an Ethernet — for example, it may be too large or formatted according to an unknown or unsupported protocol.

Forwarded Outbound
The number of frames forwarded by the selected bridge interface to the other interface on the bridge.

Lack of Buffer Space
The number of frames that were discarded specifically because the NB-30's frame buffer could not keep up with the rate of traffic on the network.

Trans Exceeded (Ethernet)
The number of frames that were discarded because the maximum time for forwarding was exceeded before it could be transmitted by the port.

Collisions (Ethernet Port Only)
The total number of collisions detected in the transmission of frames by the selected port. A collision is a natural by-product of a busy network — although an extremely high rate might indicate a data loop or a node with a hardware problem.

Trans. Aborted (Ethernet Port Only)
The total number of frame transmissions from this port that had to be aborted because of an excessive number of collisions.

Out of Window Coll. (Ethernet Port Only)
The number of collisions at this port that were out of the standard collision window (51.2μs) due to a network problem experienced by the bridge. The problem may be that the network length exceeds specifications, or that a node is transmitting without listening for carrier sense.

CRC Errors
The total number of frames received by the port that had Cyclical Redundancy Check (CRC) errors. A CRC error indicates the packet was damaged in transit — since a frame check sequence of the packet does not match that recorded in the frame by the transmitting station.

Frame Alignments
The number of frames received by the port from the network that were misaligned — that is, in which a byte of data in the packet contained less than 8 bits. This may indicate a packet formation problem on the part of a node, a problem of interference with the cabling, or a network design with cascaded multi-port transceivers (which does not meet IEEE 802.3 specifications).

Giant Packets (Ethernet Port Only)
The number of giant frames the Ethernet port has received from the network. A giant frame exceeds the maximum Ethernet frame size of 1518 bytes (excluding the preamble).

Timeout (Remote Port Only)
The number of frames that were discarded because the maximum time for forwarding was exceeded before it could be transmitted by the remote port.

Total Errors
The total number of any errors processed by the selected port.

Nothing
The selected scale is not currently in use.

Configuring Performance Graphs

To configure the Bridge Performance Graph:

1. Using the mouse, click on a scale button. A menu will appear.

   For the Bridge Performance Graph, **Frames Forwarded** appears next to the blue scale by default; **Frames Received** appears next to the red scale.

   For the Ethernet Port Performance Graph, **Collisions** appears next to the blue scale by default; **Frames Received** appears next to the red scale.

   For the Remote Port Performance Graph, **Forwarded Outbound** appears next to the blue scale by default; **Frames Received** appears next to the red scale.

2. Click on the desired frames mode:

   For the Bridge Performance Graph, the options are **Frames Forwarded**, **Frames Received**, **Frames Filtered**, **Device Errors**, or **Nothing**.

   For the Ethernet Port Performance Graph, the options are **Frames Received**, **Discarded Inbound**, **Forwarded Outbound**, **Lack of Buffer Space**, **Trans. Exceeded**, **Collisions**, **Trans. Aborted**, **Out of Window Coll.**, **CRC Errors**, **Frame Alignments**, **Giant Packets**, **Total Errors**, or **Nothing**.

   For the Remote Port Performance Graph, the options are **Frames Received**, **Forwarded Outbound**, **Lack of Buffer Space**, **CRC Errors**, **Frame Alignments**, **Timeout**, **Total Errors**, or **Nothing**.

Once you have selected a new mode, it will appear in its respective button. After the next poll, the Performance Graph will refresh and begin to measure NB-30 bridging performance using the new mode.

Bridge Summary Statistics

A Summary Statistics window lets you see the packets received, forwarded, or filtered on all networks supported by the NB-30, as well as errors on all networks.

All statistics are read directly from the device, and are updated with each poll from SPECTRUM Element Manager to the device.

To access the device-level Bridge Performance Graph window:

1. From the Bridge Status window, click on **Bridge**. A menu will appear.
2. Click on **Summary Statistics...**. The NB-30 Bridge Summary Statistics window, Figure 3-3, will appear.

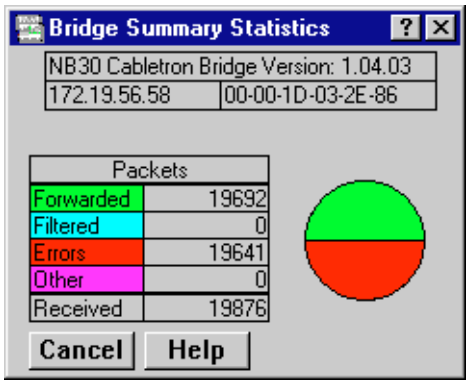


Figure 3-3. Bridge Summary Statistics Window

The following color-coded fields appear in the Bridge Summary Statistics window. The first four statistics fields are also represented visually by a color-coded pie chart (green = forwarded packets, blue = filtered packets, red = error packets, magenta = other packets).

Packets Forwarded (Green)
The number of good packets forwarded across the bridge by both ports on the network.

Packets Filtered (Blue)
The number of good packets filtered by both ports on the bridge.

Errors (Red)
The number of packets with an error that were detected by both ports on the bridge.

Other (Magenta)
When the bridge is in normal FORWARDING or FILTERING operation, this field counts the number of Bridge Protocol Data Units (BPDUs).

If the bridge is in the LISTENING or LEARNING state, no packets are forwarded or filtered — and all packets detected by the bridge are counted in this category.

This field does not include packets already tallied in the Forwarded, Filtered, and Received fields.

Packets Received
The total number of packets received by the bridge's two ports (this total does not include the packets tallied in the Other field).

Ethernet and Remote Port Statistics

The Statistics window lets you see statistics gathered at the Ethernet and Remote ports of the bridge. These statistics display information about the normal traffic filtered or forwarded by the bridge ports, as well as errors encountered by the ports and packets that were discarded for various reasons.

As with the Bridge Summary Statistics window, a color-coded pie chart provides a graphical breakdown of traffic filtered or forwarded by the bridge ports, as well as errors and non-bridged traffic (green = forwarded packets, blue = filtered packets, red = error packets, magenta = other packets).

All statistics are read directly from the device, and are updated with each poll from SPECTRUM Element Manager to the device.

To access the Ethernet port Statistics window:

1. Click on **Ethernet** to reveal the Port menu.
2. Choose **Statistics**. The following window, Figure 3-4, will appear.

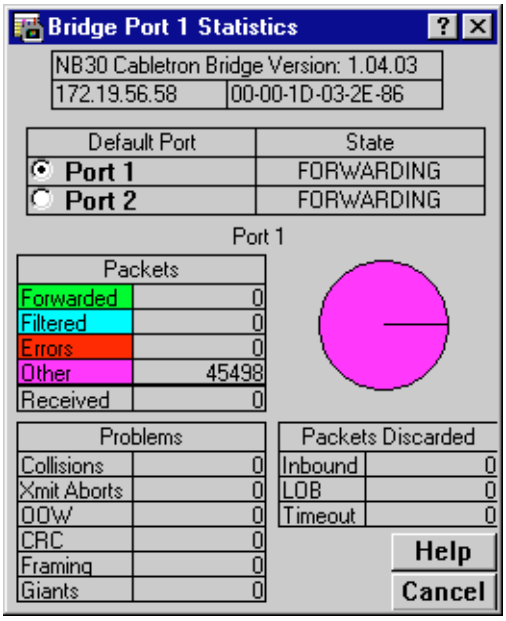


Figure 3-4. Ethernet Port Statistics Window

To access the remote port Statistics window:

1. Click on **Remote** to reveal the Port menu.
2. Choose **Statistics...**. The following window, Figure 3-5, will appear.

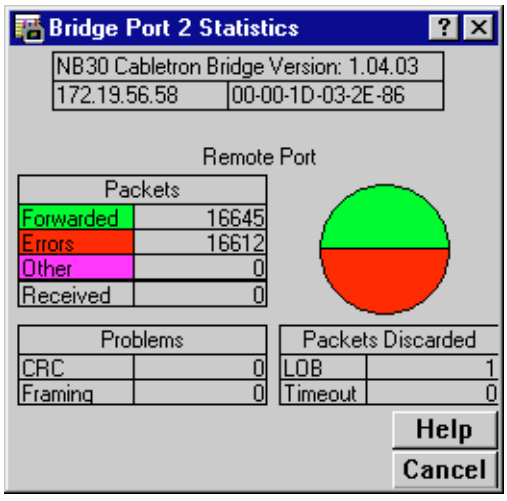


Figure 3-5. Remote Port Statistics Window

Port Packet Statistics

The following statistics fields appear in the Ethernet and Remote Port Statistics windows under the heading "Packets." These are also graphically displayed in the pie chart (with the exception of Packets Received).

Note that the Remote Port Statistics window does not record Packets Filtered.

Packets Forwarded (Green)
The number of good packets forwarded by the selected port.

Packets Filtered (Blue — Ethernet Port Only)
The number of good packets filtered by the Ethernet port.

Errors (Red)
The number of packets with an error that were detected by the selected port.

Other (Magenta)
When the bridge is in normal FORWARDING or FILTERING operation, this field counts the number of Bridge Protocol Data Units (BPDUs) processed by the port.

If the bridge is in the LISTENING or LEARNING state, no packets are forwarded or filtered — and all packets detected by the port are counted in this category.

This field does not include packets already tallied in the Forwarded, Filtered, and Received fields.

Packets Received
The total number of packets received by the bridge port. This total does not include the packets tallied in the Other field.

Ethernet and Remote Port Problem Statistics

Note that some of these statistics, which tally bridging problems, only apply to the Ethernet port.

Collisions (Ethernet Port Only)
The total number of collisions detected in the transmission of frames by the selected port.

Xmit Aborts (Ethernet Port Only)
The total number of frame transmissions from this port that had to be aborted because of an excessive number of collisions.

OOW (Ethernet Port Only)
The number of collisions at this port that were out of the standard collision window (51.2μs) due to a network problem experienced by the bridge.

CRC
The total number of frames received by the port that had Cyclical Redundancy Check (CRC) errors.

Framing
The number of frames received by the port from the network that were misaligned — that is, in which a byte of data in the packet contained less than 8 bits.

Giants
The number of frames that were received by the port which were too large for the network. A giant exceeds the maximum Ethernet frame size of 1518 bytes (excluding preamble).

Ethernet and Remote Port Packet Discarded Statistics

These fields display the number of packets that were discarded at one of the bridge ports. Note that the Inbound count applies to the Ethernet port only.

Inbound (Ethernet Port Only)
Displays the number of packets received by the port which were discarded for any reason (lack of buffer space, the frame time-to-live was exceeded, or the packet was too large for the network).

LOB
The number of frames that were discarded at the port specifically because the NB-30's frame buffer was unable to keep up with the rate of traffic on the network.

Timeout
The number of frames that were discarded at the port because the frame's time-to-live (the maximum time for forwarding) was exceeded before it could be transmitted by the port.

Bridge Spanning Tree

The Bridge Spanning Tree window allows you to display and modify the NB-30's bridge port information and protocol parameters relating to the Spanning Tree Algorithm.

In a network design with multiple transparent bridges placed in parallel (i.e., attached to the same local network segment), only a single bridge should forward data through the LAN, leaving the remaining bridges on the segment in a standby state so that another can assume the bridging responsibility (should the currently active bridge go down). The Spanning Tree Algorithm (STA) is the method that bridges use to communicate with each other to ensure that only a single data route exists between any two end stations.

In Transparent bridging, Spanning Tree *must* be used to prevent data loops (since in an Ethernet environment, a packet propagated down multiple paths would cause higher volumes of traffic and collisions that would cripple a network that relied on carrier sense and collision detection).

In a network designed with multiple bridges placed in parallel, Spanning Tree selects a controlling Root Bridge and Port for the entire bridged local area network, and a Designated Bridge and Port for each individual network segment. The Root bridge is the one that selects one of two or more available bridge paths between two end stations, basing its decision on factors associated with each of the bridges in the path. A Designated Port/Bridge for a network segment relays frames toward the Root Bridge, or from the Root Bridge onto the network segment. When data passes from one end station to another across a bridged local area network, it is forwarded through the Designated Bridge/Port for each network segment towards the Root Bridge, which in turn forwards frames towards Designated Bridges/Ports on its opposite side.

During the Root Bridge selection process, all bridges on the network communicate STA information via Bridge Protocol Data Units (BPDUs). It is with BPDUs that the bridges collectively determine the current network topology and ensure that all bridges have current topology information.

To access the Bridge Spanning Tree window:

1. From the NB-30 Bridge Status window, click on **Bridge**. The Bridge menu will appear.
2. Click on **Spanning Tree...**. The Bridge Spanning Tree window, Figure 3-6, will appear.

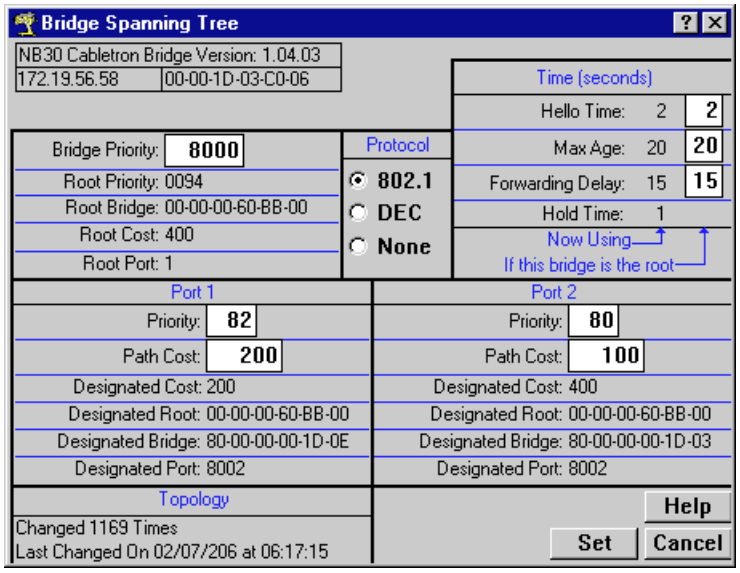


Figure 3-6. Bridge Spanning Tree Window

Bridge Level Parameters

Bridge Priority

This field displays the "priority" component of the NB-30's unique bridge identifier. The Spanning Tree Algorithm assigns each bridge a unique identifier, which is derived from the bridge's MAC address and the Priority. The bridge with the lowest value of bridge identifier is selected as the Root. A lower priority number indicates a higher priority; a higher priority enhances a bridge's chance of being selected as the Root.

You can edit this text box to change network topology, if needed. The default value is 8000.

Part of a bridge's Identifier is based on its MAC address. In most network installations, the difference between bridge performance may be negligible. You may, however, find your data bottle-necked in installations where both a low-performance bridge and a high-performance bridge are attached to the same LAN segment, and the two (or more) bridges have the same Priority component set (e.g., at the default 8000 Hex). In such a scenario you may want to alter the Priority component of the higher performance bridge to ensure that it becomes root for the segment (or overall root). Remember, if Priority components are equal, the bridge on the segment with the lowest Hex value of MAC address would have a better chance of being selected as the root bridge — as it would have a lower Bridge Identifier. If your bridges come from multiple vendors, they will have different MAC address values (e.g., Cabletron devices have a lower MAC address than 3Com devices); if they come from the same vendor, the bridge with the earlier manufacture date will be likely to have the lower MAC address value.

Root Priority

The "priority" component of the unique bridge identifier for the bridge that is currently the root bridge on the network.

Root Bridge

Displays the MAC address of the bridge that is currently functioning as the Root Bridge.

Root Cost

Indicates the cost of the data path from this bridge to the Root Bridge. Each port on each bridge adds a "cost" to a particular path that a frame must travel. For example, if each port in a particular path has a Path Cost of 1, the Root Cost would be a count of the number of bridges along the path. (You can edit the Path Cost of bridge ports as described later.) The Root Bridge's Root Cost is 0.

Root Port

This field displays the identifier (the physical index number) of the NB-30 bridge port that has the lowest cost path to the Root Bridge on the network. If the NB-30 is currently the Root Bridge, this field will read 0.

Protocol

Displays the Spanning Tree Algorithm Protocol type the NB-30 is currently using. The choices are:

- 802.1
- DEC (DEC Lanbridge 100)
- None

The following four fields display values used for various Spanning Tree timers that are set at the Root Bridge and this bridge. In Spanning Tree operations, the value used for the tree is the one set at the Root Bridge (with the exception of Hold Time, which is a fixed value); but you can change the value for each bridge on your network in the event that it becomes Root.

Hello Time

This parameter indicates, in seconds, the length of time the Root Bridge (or bridge attempting to become the Root) waits before resending Configuration BPDUs. The range for this field is 1 to 10 seconds, with a default value of 2 seconds. The Root Bridge sets the Hello Time.

Max Age

This parameter displays the bridge's BPDU ageing timer. This controls the maximum time a BPDU can be retained by the bridge before it is discarded. During normal operation, each bridge in the network receives a new Configuration BPDU before the timer expires. If the timer expires before a Configuration BPDU is received, it indicates that the former Root is no longer active. The remaining bridges begin Spanning Tree operation to select a new Root. The current Root Bridge on the network sets the Max Age time. The range for this field is 6 to 40 seconds, with a default value of 20 seconds.

Forwarding Delay

This parameter displays the time period which elapses between states while the bridge is moving to the Forwarding state. For example, while moving from a Blocking to a Forwarding state, the port first moves from Blocking to Listening to BPDU activity on the network, remains there for the Forward Delay period, then moves to the Learning State (and remains in it for the Forward Delay period), and finally moves into a Forwarding state. This timer is set by the Root Bridge. During a topology change, the Forward Delay is also used as the Filtering Database Ageing Time (refer to the next section), which ensures that the Filtering Database maintains current topology information.

Hold Time

This parameter displays the minimum time (1 second) that can elapse between the transmission of Configuration BPDUs through a bridge port. The Hold Time ensures that Configuration BPDUs are not transmitted too frequently through any bridge port. Receiving a BPDU starts the Hold Timer. After the Hold Timer expires, the port transmits its Configuration BPDU to send configuration information to the Root. The Hold Time is a fixed value, as specified by the IEEE 802.1d specification.

Bridge Port Level Parameters

The following fields are applicable to each bridge port on the NB-30.

Priority
If two or more ports on the same bridge are connected to the same LAN segment, they will receive the same Root ID/Root Cost/Bridge ID information in Configuration BPDUs received at each port. In this case, the BPDU's Port ID information — the transmitting port's identifier and its manageable Priority component — is used to determine which is the Designated Port for that segment.

A lower assigned value gives the port a higher Priority when BPDUs are compared. The allowable range is 0-FF hexadecimal (0-255 decimal); the default is 80 hexadecimal.

Path Cost
Displays the cost that this port will contribute to the calculation of the overall Root path cost in a Configuration BPDU transmitted by this bridge port. You can lower a port's Path Cost to make the port more competitive in the selection of the Designated Port — for example, you may want to assign a lower path cost to a port on a higher performance bridge. The allowable range is 1 to 65535.

Designated Cost
Displays the cost of the path to the Root Bridge of the Designated Port on the LAN to which this port is attached. This cost is added to the Path Cost to test the value of the Root Path Cost parameter received in Configuration BPDUs.

Designated Root
Displays the unique bridge identifier of the bridge that is assumed to be the Root Bridge.

Designated Bridge
Displays the network address portion of the Bridge ID (MAC address/priority component) for the bridge that is believed to be the Designated Bridge for the LAN associated with this port.

The Designated Bridge ID, along with the Designated Port and Port Identifier parameters for the port, is used to determine whether this port should be the Designated Port for the LAN to which it is attached. The Designated Bridge ID is also used to test the value of the Bridge Identifier parameter in received BPDUs.

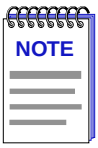
Designated Port
Displays the network address portion of the Port ID (which includes a manageable priority component) of the port believed to be the Designated Port for the LAN associated with this port.

The Designated Port ID, along with the Designated Bridge and Port Identifier parameters for the port, is used to determine whether this port should be the Designated Port for the LAN to which it is attached. Management also uses it to determine the Bridged LAN topology.

Topology
This indicates how many times the bridge's Topology Change flag has been changed since the NB-30 was last powered-up or initialized. The Topology Change flag increments each time a bridge enters or leaves the network, or when the Root Bridge ID changes. The field also indicates the date and time at which the topology last changed.

Configuring Spanning Tree

The Bridge Spanning Tree window allows you to update the following parameters for your NB-30 bridge. When you have finished making changes to the following individual parameters, you must click on **Set** at the bottom of the Spanning Tree window to write the changes to the device.



Any values you set at the bridge will cause a Topology Change flag to be issued in the next Configuration BPDUs it transmits. This will cause the bridged network to immediately recalculate Spanning Tree and change topology accordingly.

Changing Bridge Priority
To change the part of the bridge address that contains the identifier used in the Spanning Tree Algorithm for priority comparisons:

1. Highlight the **Bridge Priority** field.
2. Enter the new identifier, in hexadecimal format; the allowed range is 0-FFFF hexadecimal.
3. Click on **Set**.

The selected Bridge Priority will be applied to the bridge (a lower number indicates a higher priority in the root selection process).

Changing the Spanning Tree Algorithm Protocol Type
To change the type of protocol used in Spanning Tree:

1. Click the mouse on the appropriate option button: **IEEE 802.1**, **DEC**, or **None**.
2. Click on **Set**.

The selected Spanning Tree Algorithm protocol type will be applied to the bridge. If you selected None, the Spanning Tree Algorithm will be disabled (if it already was enabled). If STA Protocol Type was changed from None to IEEE 802.1 or DEC, you must restart the bridge for the newly selected STA protocol to be applied.

All bridges in a network must use the same Spanning Tree version. Mixing Spanning Tree Algorithm protocols will cause an unstable network.

Changing Hello Time

If the bridge is the Root Bridge, or is attempting to become the Root, and you want to change the length of time the bridge waits between sending configuration BPDUs:

1. Highlight the **Hello Time** field, and type in a new value.
2. Click on **Set**.

The IEEE 802.1d specification recommends that Hello Time = 2 seconds, with an allowable range of 1 to 10 seconds.

Changing Max Age Time

If the NB-30 is the Root Bridge or attempting to become the Root, and you want to change the maximum time that bridge protocol information will be kept before it is discarded:

1. Highlight the **Max Age** field, and type in a new value.
2. Click on **Set**.

The IEEE 802.1d specification recommends that Max Age = 20 seconds, with an allowable range of 6 to 40 seconds.

Changing Forwarding Delay Time

If the NB-30 is the Root Bridge or attempting to become the Root, and you want to change the time period the bridge will spend in the Listening state (e.g., either listening to BPDU activity on the network while moving from the Blocking to the Learning state or in the Learning state while the bridge is moving from the Listening to the Forwarding state):

1. Highlight the **Forwarding Delay** field, and type in a new value.
2. Click on **Set**.

The IEEE 802.1d specification recommends that Forward Delay = 15 seconds, with an allowable range of 4 to 30 seconds.

To ensure proper operation of the Spanning Tree Algorithm, the IEEE 802.1d specification recommends that you always observe the following relationship between Forwarding Delay, Max Age, and Hello Time:

$$2 \times (\text{Forwarding Delay} - 1.0) \geq \text{Max Age} \geq 2 \times (\text{Hello Time} + 1.0)$$

Changing Port Priority

To change the part of the Port Priority used in priority comparisons:

1. Highlight the port **Priority** field for the desired port, and enter the new priority identifier. Only valid hexadecimal numbers (0 to FF) are allowed in this field. The default is 80 hexadecimal.
2. Click on **Set**. The new port priority will be saved.

Changing Path Cost

To change the Path Cost:

1. Highlight the **Path Cost** field for the desired port, and type in a new value from 1 to 65535 decimal (default is 100 decimal).
2. Click on **Set**.

The new path cost will be applied to the port.

Filtering Database

The Filtering Database, which makes up the IEEE 802.1d Source Address Table, is used to determine which frames will be forwarded across the bridge from one network segment to another.

Transparent bridges like the NB-30 use the Filtering Database to determine a packet's route through the bridge. During initialization, the bridge copies the contents of its Permanent Database to the Filtering Database. Next, the bridge learns network addresses by entering the source address and port association of each received packet into the Filtering Database. When in the Forwarding state, the bridge examines each received packet, and then compares the destination address to the contents of the Filtering Database. If the destination address is located on the network from which the packet was received, the bridge filters (does not forward) the packet. If the destination address is located on a different network, the bridge forwards the packet to the appropriate network. If the destination address is not found in the Filtering Database, the bridge forwards the packet to all networks. To keep Filtering Database entries current, older entries are purged after a period of time, which is called the Dynamic Ageing Time.

The NB-30 Filtering Database consists of two separate databases: the Static and the LearnedDatabases.

The **Static Database** contains addresses that are entered by a network administrator. You add these addresses directly to the database while the bridge is powered up, or to the device's battery-backed RAM so that they are stored on shutdown until the next power-up.

The **Learned Database** consists of addresses that accumulate as part of the bridge's learning process as it is up and running. These do not remain in the Source Address Table when the system is shut down. The Learned Database also contains the addresses that are in the Static Database upon start-up of the bridge.

Entries to the Source Address Table are one of four types: **Permanent**, **Static**, **Dynamic**, or **Learned**.

- **Permanent** entries are addresses that you add to the Static Database (via the Filtering Database window) that are stored in the device's battery-backed RAM. Since they remain in the device on shutdown or restart, they are considered "Permanent."
- **Static** entries are addresses that you add to the Static Database (via the Filtering Database window). These entries remain in the device until it is shut down.
- **Dynamic** entries are addresses that you add to the Static Database (via the Filtering Database window). With the Aging Time feature, you set the time period that these addresses are saved in the Source Address Table. Addresses that have not transmitted a packet during one complete cycle of the aging timer are deleted from the database.
- **Learned** entries are addresses that are added to the Learned Database through the bridge's learning process. With the Aging Time feature, you set the time period that these addresses are saved in the Source Address Table. Addresses which are inactive within a cycle of the aging timer are dropped from the database.

  Learned address entries are divided into two types, **Learned** and **Self**. Address entries classified as **Learned** have transmitted frames destined for a device attached to a device port's connected segment. Address entries classified as **Self** are those that have sent a frame with a destination address of one of the device's bridging ports.

At the Filtering Database window (Figure 3-7, page 3-26), you can view the number of entries of each type: Permanent, Static, Dynamic, or Learned.

A scrollable Address Entry panel allows you to:

- View the address entries in the Filtering Database.
- Alter an entry's type (e.g., from Learned to Permanent, Dynamic, or Static).
- View and configure the bridging action taking place on the packets entering each of the bridging ports.

In addition, you can use buttons to add individual addresses to, or delete them from, these databases, or clear all Permanent, Static, or Dynamic entries in the database.

To access the Filtering Database window:

1. From the Bridge Status window, click on **Bridge** to display the Bridge menu.
2. Drag down to select **Filtering Database.** The Filtering Database window, Figure 3-7, will appear.

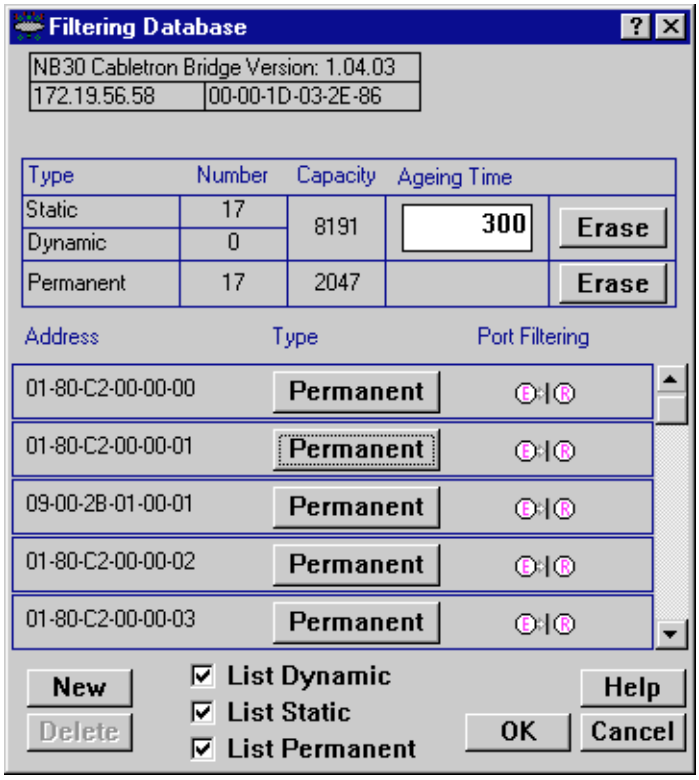


Figure 3-7. The Filtering Database Window

The following fields are listed in the top portion of the Filtering Database window.

Type
Indicates the type of entry in the database: Static, Dynamic, or Permanent.

Number
Displays the current number of Static, Dynamic, and Permanent address entries.

Capacity
Indicates the total capacity of each entry type in the Static and Learned databases.

Ageing Time
Indicates the length of time, in seconds, that Dynamic and Learned Addresses in the Source Address Table are allowed to remain inactive before they are dropped from the database. The allowable time range for these entries is 10 to 1,000,000 seconds; the default Ageing Time is 300 seconds. Ageing Time is not applicable to Static or Permanent entries. You can configure this field, as described in the next section.

The following fields are applicable to the scrollable Address Entry panel of Filtering Database entries.

List
The List checkboxes at the bottom of the window indicate whether the associated entry type (Dynamic, Static, or Permanent) will be displayed in the scrollable table of address entries. A check next to the entry type indicates that it will be displayed.

Address
Lists the addresses for which the bridge's Filtering Database has forwarding and/or filtering information.

Type
Indicates the type of an entry in the database. The possible types are Dynamic, Static, or Permanent. You can alter the entry type, as described in the next section.

Port Filtering
Indicates the action that will take place at each bridge port when it receives frames from the selected address entry. An arrow between the ports indicates that the frames received from the address will be forwarded to the port's associated segment ( ). A vertical bar between the ports indicates that frames will be filtered (blocked) from the port's associated segment (). You can alter the port filtering action, as described in the next section.

Configuring the Filtering Database

You can configure the Filtering Database by:

- Altering the Ageing Time for Dynamic entries.
- Changing the type of entry with the Type buttons.
- Changing the Port Filtering action at each bridge port.
- Adding or deleting individual Filtering Database entries.
- Clearing all Permanent or Acquired Database entries from the Filtering Database.

Note that although configuration changes will appear in the window, no action actually takes place in the bridge's Filtering Database until you click on **OK** in the bottom right of the window. This saves the new configuration.

Altering the Ageing Time
To alter the Ageing Time for Dynamic entries:

1. Highlight the **Ageing Time** field with the cursor.
2. Type in the new Ageing Time (allowable range is 10 to 1,000,000 seconds).

Changing the Type of Entry

You can change the type of any entry in the filtering database to be a Static or Permanent entry. To do so:

1. Click on the shadowed **Type** button. A menu will appear with the three possible types to which the entry can be changed.

   Dynamic entries can be changed to Permanent or Static entries.

   Static entries can be changed to Permanent entries.

   Permanent entries can be changed to Static entries (although the 17 pre-defined multicast addresses will always remain in the Permanent database).

2. Highlight the desired type.

Changing the Port Filtering Action

You can change the Port Filtering action at each bridge port from its current action to the opposing action.

1. Click on the port to alter its filtering action from forwarding frames from the associated address ( ), to filtering frames ( ) (or vice versa).

Adding or Deleting Individual Filtering Database Entries

You can add or delete entries individually from the Filtering Database.

To add an address:

1. Click on **New** in the lower left of the window. A window like that shown in Figure 3-8 will appear.

Figure 3-8. Filter Database — New Filter Window

2. In the provided text field, type in the Ethernet address (Hex format) for which you desire bridging. Be sure to add “-” as a separator between each byte in the address.

3. Click on **OK**.

4. Specify the **Port Filtering** action on the address entry as described in the previous section.

To delete an address:

1. Click to highlight the address entry in the Address Entry panel that you wish to delete from the filtering database.
2. Click on **Delete**.

Erasing Entries from the Permanent or Acquired Databases

You can erase the entire Acquired or Permanent Databases (not including the 17 multicast address entries that are automatically entered in the Permanent Database on power-up). To do so:

1. Click on **Erase** next to the Static/Dynamic entry count to clear all entries from the Acquired Database, or next to the Permanent entry count to clear all entries from the Permanent Database (excepting the 17 automatic entries).

DSX-1 Summary

If you have a DSX-1 module installed in your NB-30, the Bridge DSX-1 Summary window allows you to test the status of the remote port's link to the bridge at the other end of the T1 link, as well as to see the status of each of the DSX-1 channels.

The diagnostic loopback test determines the integrity of a T1 link to a remote NB-30 bridge. With the DSX-1 Summary window, you can determine the type of data test pattern to use during the loopback test, and then run the test and view its results. Refer to your local management documentation for more information.

The DSX-1 Summary window also lets you see the assignment of the 24 possible channels that can be used for the T1 link.

To access the DSX-1 Summary window:

1. Click on **Remote** to reveal the remote Port menu.
2. Choose **DSX-1...**. The Bridge DSX-1 Summary window, Figure 3-9, will appear.

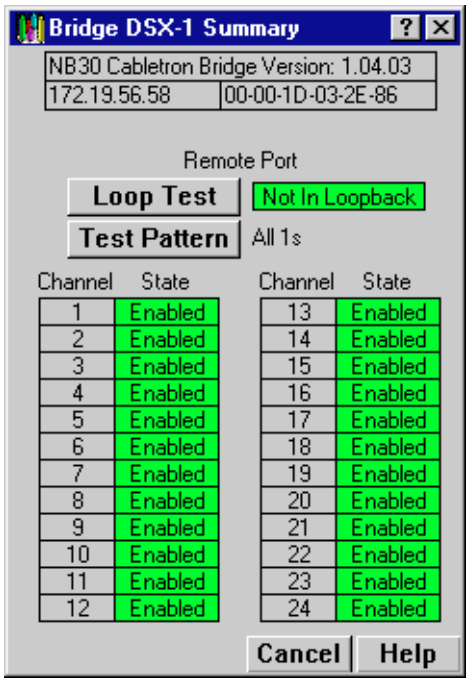


Figure 3-9. Bridge DSX-1 Summary Window

Configuring, Running, and Checking the Loopback Test

To configure and run the loopback test:

1. Click on **Test Pattern**. A menu will appear.
2. Click to select the appropriate data pattern option to be used in the loopback test:

   Alternating 1/0s

   All 1s

   All 0s

   Incrementing Data

   The selected test pattern will display next to the menu button.
3. To initiate the loopback test, click on **Loop Test**. The test will begin.

NOTES

A loopback test will cause the remote port of the monitored bridge to temporarily go off-line. This will cause Spanning Tree to reconfigure at the monitored bridge (the bridge will go into Standby state as it listens to the network and learns the topology).

Your NB-30 icon will also change color to indicate a test in progress (informational state).

To halt a test in progress and return to the Bridge Status window, click on **Cancel**.

The results of the test will be displayed in the status field next to the test button:

- Not in Loopback — Indicates that the DSX-1 port is currently in normal operating condition; a loopback test is not being performed.
- Loopback in Progress — The DSX-1 port is undergoing a test.
- Network Loopback — The remote port is currently looped toward the T1 link.
- Loopback Passed — The test was successful, and the T1 link is valid.
- Loopback Failed — The test failed, and the T1 link may be malfunctioning.

Viewing the T1 Link Channel Status

The DSX-1 Summary window also lets you see the status of each channel of the T1 link. Note that both bridges linked via the T1 line must share the same channel assignment. Up to 24 channels can be used in an NB-30 T1 link.

An **Enabled** status indicates that the associated channel is assigned to the T1 link; a **Disabled** status indicates the associated channel is not used for the link. The administrative state of each channel is set via local management. Refer to your NB-30 Local Management documentation for more information.

Restoring Bridge Defaults

From the Bridge Status window, you can use the **Restore Defaults** option to reset bridge identifying and operating parameters back to their firmware default settings.

Among the firmware defaults restored are those for Spanning Tree, Ethernet port redundancy (accessible via local management and MIBTree), and T1 channel assignment (accessible via local management and MIBTree). Make sure that network operations will not be adversely affected before selecting the Restore Defaults option.

The following operating parameters are accessible via SPECTRUM Element Manager. The restored defaults will be visible on-screen.

- Bridge Location to LOCAL
- Ethernet Port Name (1) to ETHERNET PORT 1
- Remote Port Name (2) to REMOTE PORT
- Net 1 Name to LAN_1
- Net 2 Name to REMOTE LINK
- Type of STA protocol to IEEE 802.1

- All Spanning Tree Algorithm information screens back to their default values. You must also restart the bridge for the new Spanning Tree information to take effect.
- Ageing Time on Filtering Database Screen back to 300 seconds
- DSX-1 Test Pattern to Alternate 1/0s
- DSX-1 Channel Assignment returns to all Enabled (read-only from remote management)

The following operating parameters can only be accessed through Local Management or via the MIB Tools utility. Restored defaults will be evident in the next Local Management session. Refer to your NB-30 Local Management documentation for more information.

- Bridge Name back to CABLETRON REMOTE BRIDGE
- Ethernet Port 2 Name to ETHERNET PORT 2
- Net Name for Enet Port 2 to LAN_2
- Number of Restarts to 0
- Default Ethernet Port to Port 1
- Enable Redundancy to NO
- Redundancy Poll Address (Ethernet Port 1/2) to 00-00-00-00-00-00
- Redundancy Poll Interval (Ethernet Port 1/2) to 5 seconds
- Redundancy Poll Max Retries to 6
- Type of Filtering to IEEE 802.1
- DSX-1 Channel Assignment returns to all Enabled

To reset parameters to their defaults:

1. Click on **Bridge**. A menu will appear.
2. Select **Restore Defaults**.

Resetting Bridge Counters

You can use the Reset Counters option to reset all statistics counters at the device back to zero. To do so:

1. Click on **Bridge**. A menu will appear.
2. Select **Reset Counters**.

Restarting the Bridge

You can use the Restart Bridge option to force the bridge to undergo a software reset. This will clear all statistics counters at the device back to zero *and* cause the Spanning Tree to be reconfigured.

1. Click on **Bridge**. A menu will appear.
2. Select **Restart Bridge**.

Index

A

Acquired Database
    erasing 3-29
Address 3-27
Ageing Time 3-26, 3-27

B

BLK (Blocking) 2-6, 3-5
Board Menus 2-5
Boot Prom, revision 2-3
Bridge
    Location 3-4
    Port Address - Local Ethernet Port 3-7
    Priority 3-19, 3-22
    Protocol Data Units (BPDUs) 3-2, 3-18
    Spanning Tree
        changing parameters 3-22
    State on Ethernet Interface 3-5
    State on Interface 3-5
    Status 3-4
        on Remote Port Interface 3-6
        window 3-3
bridging state 2-6
BRK 2-6, 3-5

C

Cabletron Systems Global Call Center 1-7
Cancel button 1-5
Capacity 3-26
CARRIER LOST 3-5
Collisions 3-11
color-coded port display 2-2
command buttons 1-5
Connection Status 2-3
CRC Errors 3-12

D

Date 3-7
DCE NOT READY/NO CTS 3-6
DCE NOT READY/NO DM 3-6
Designated
    Bridge 3-18, 3-21
    Cost 3-21
    Port 3-18, 3-21
    Root 3-21
Device
    date 2-8
    Errors 3-11
    Menu 2-5
    Name 1-4
    time 2-8
    Type 2-7
diagnostic loopback test 3-29
    performing the test 3-30
DIS (Disabled) 2-6, 3-5
disable a bridge network 2-9, 3-8
DISABLED 3-4
Discarded Inbound 3-11
DSX-1 Summary 3-29
Dynamic Ageing Time 3-24
Dynamic entries 3-25

E

erasing Acquired or Permanent database
        entries 3-29
Errors 3-14

F

Filtering Database 3-2, 3-24
    Adding Entries 3-28
    Changing Ageing Time 3-27
    Changing an Entry Type 3-28
    Changing Port Filtering Action 3-28
    configuring 3-27
    Deleting Entries 3-28
Filtering Database window 3-25
Firmware 2-3
    revision 2-3
    version 1-7
Forwarded Outbound 3-11
Forwarding Delay 3-20, 3-23

Frame Alignments 3-12
Frames
  Filtered 3-10
  Forwarded 3-10
  Received 3-10, 3-11
FWD (Forwarding) 2-6, 3-5

G

Getting Help 1-6
Giant Packets 3-12
Global Call Center 1-7

H

Hello Time 3-20, 3-23
Help button 1-5, 1-6
Help Menu 2-5
Hold Time 3-20

I

Interface Name 3-7
Interface Type 3-7
IP address 1-5, 2-3

L

Lack of Buffer Space 3-11
Learned Database 3-24
Learned entries 3-25
LINK OK/DCE READY 3-6
LIS (Listening) 2-6, 3-5
List checkbox 3-27
LRN (Learning) 2-6, 3-5

M

MAC address 1-5, 2-3
Max Age 3-20, 3-23
menu structure 2-4
MIB components 2-6
mouse usage 1-3

N

NB30 series bridge 1-1
NET LOOP/LINK LOST 3-6
NET LOOP/LINK OK 3-6
NET LOOP/RED ALARM 3-6
NET LOOP/YELLOW ALARM 3-6
NO EXT CLOCK 3-7
NORMAL LOOP/LINK LOST 3-6
NORMAL LOOP/LINK OK 3-6
NORMAL LOOP/RED ALARM 3-6
NORMAL LOOP/YELLOW ALARM 3-6
Nothing 3-11, 3-12
Number 3-26

O

OFF 3-5
OK button 1-5
OK/SQE OFF 3-5
OK/SQE ON 3-5
ON LINE 3-4
Other 3-14
Out of Window Coll. 3-12

P

Packets Filtered 3-14
Packets Forwarded 3-14
Packets Received 3-14
Path Cost 3-21, 3-24
Performance Graph
  configuring 3-12
Permanent Database
  erasing 3-29
Permanent entries 3-25
port display, color codes 2-2
Port
  Filtering 3-27
  Name 1-5
  Number 1-5
  Packet Discarded Statistics 3-17
    Inbound 3-17
    LOB 3-17
    Timeout 3-17
  Packet Statistics 3-16
    Errors 3-16
    Other 3-16
    Packets Filtered 3-16
    Packets Forwarded 3-16
    Packets Received 3-16
  Priority 3-21, 3-24
  Problem Statistics 3-16
    Collisions 3-16
    CRC 3-17
    Framing 3-17
    Giants 3-17
    OOW 3-16
    Xmit Aborts 3-16
  Status 2-3

Protocol 3-20

R

related documents 1-2
REM LOOP/LINK LOST 3-6
REM LOOP/LINK OK 3-6
REM LOOP/RED ALARM 3-6
REM LOOP/YELLOW ALARM 3-6
Reset Counters 3-32
Restart Bridge 3-32
Restore Defaults 3-31
Root
    Bridge 3-18, 3-19
        selection process 3-18
    Cost 3-19
    Port 3-19
    Priority 3-19

S

Segment Name 3-7
Set button 1-5
Source Address Table 3-24
Spanning Tree Algorithm (STA) 3-2
    Protocol Type 3-20, 3-22
Spanning Tree window 3-3
STANDBY 3-4
Static Database 3-24
Static entries 3-25
Summary Statistics 3-13

T

T1 Link Channel Status 3-31
technical support 1-7
Time 3-7
Timeout 3-12
Topology 3-22
Total Errors 3-12
Trans Exceeded 3-11
Trans. Aborted 3-11
Type 3-26, 3-27, 3-28

U

UpTime 1-5, 2-3, 3-4
Utilities Menu 2-5